



Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402

August 28, 2013

10 CFR 2.202  
10 CFR 50.4

ATTN: Document Control Desk  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

Sequoyah Nuclear Plant, Units 1 and 2  
Facility Operating License Nos. DPR-77 and DPR-79  
NRC Docket Nos. 50-327 and 50-328

**Subject: First Six-Month Status Report in Response to the March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049) for Sequoyah Nuclear Plant**

- References:
1. NRC Order Number EA-12-049, "Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated March 12, 2012 (ML12054A735)
  2. NRC Interim Staff Guidance JLD-ISG-2012-01, "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," Revision 0, dated August 29, 2012 (ML12229A174)
  3. NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide" Revision 0, dated August 2012 (ML12242A378)
  4. Letter from TVA to NRC, "Tennessee Valley Authority (TVA) - Initial Status Report in Response to the March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)," dated October 29, 2012 (ML12307A104)

AISI  
NRG

5. Letter from TVA to NRC, "Tennessee Valley Authority (TVA) - Overall Integrated Plan in Response to the March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049) for Sequoyah Nuclear Plant," dated February 28, 2013 (ML13063A183)

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued an order (Reference 1) to Tennessee Valley Authority (TVA). Reference 1 was immediately effective and directs TVA to develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities following a beyond-design-basis external event. Specific requirements are outlined in Attachment 2 of Reference 1.

Reference 1 required submission of an initial status report 60 days following issuance of the final interim staff guidance (Reference 2) and an overall integrated plan pursuant to Section IV, Condition C. Reference 2 endorses industry guidance document Nuclear Energy Institute (NEI) 12-06, Revision 0 (Reference 3) with clarifications and exceptions identified in Reference 2. Reference 4 provided the TVA initial status report regarding mitigation strategies. Reference 5 provided the TVA Sequoyah Nuclear Plant, Units 1 and 2 overall integrated plan.

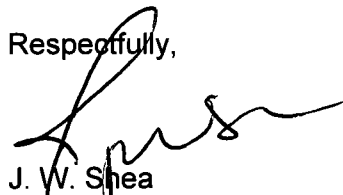
Reference 1 requires submission of a status report at six-month intervals following submittal of the overall integrated plan. Reference 3 provides direction regarding the content of the status reports. The purpose of this letter is to provide the first six-month status report pursuant to Section IV, Condition C.2, of Reference 1, that delineates progress made in implementing the requirements of Reference 1. The enclosed report provides an update of milestone accomplishments since submittal of the overall integrated plan, including any changes to the compliance method or schedule.

The Enclosure describes the plans that TVA will use to meet the regulatory requirements outlined in Attachment 2 of Reference 1, but does not identify any additional actions to be taken by TVA. Therefore, this letter contains no regulatory commitments.

If you have any question regarding this submittal, please contact Kevin Casey at (423) 751-8523.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 28th day of August 2013.

Respectfully,



J. W. Shea  
Vice President, Nuclear Licensing

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Enclosure:

Tennessee Valley Authority Sequoyah Nuclear Plant's First Six-Month Status Report for the Implementation of Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events

cc (Enclosure):

NRR Director - NRC Headquarters  
NRO Director - NRC Headquarters  
NRC Regional Administrator - Region II  
NRC Project Manager - Sequoyah Nuclear Plant  
NRC Senior Resident Inspector - Sequoyah Nuclear Plant

**ENCLOSURE**

**TENNESSEE VALLEY AUTHORITY SEQUOYAH NUCLEAR PLANT'S FIRST SIX-MONTH  
STATUS REPORT FOR THE IMPLEMENTATION OF ORDER EA-12-049,  
ORDER MODIFYING LICENSES WITH REGARD TO REQUIREMENTS FOR MITIGATION  
STRATEGIES FOR BEYOND-DESIGN-BASIS EXTERNAL EVENTS**

## ENCLOSURE

### **1 Introduction**

Tennessee Valley Authority developed an Overall Integrated Plan (Reference 1 in Section 8), for Sequoyah Nuclear Plant documenting the diverse and flexible strategies (FLEX), in response to Reference 2. This attachment provides an update of milestone accomplishments since submittal of the Overall Integrated Plan, including any changes to the compliance method or schedule.

### **2 Milestone Accomplishments**

The following milestone(s) have been completed since the development of the Overall Integrated Plan (Reference 1), and are current as of July 30, 2013.

FLEX Strategy Evaluation - Complete

### **3 Milestone Schedule Status**

The following provides an update to Attachment 2 of the Overall Integrated Plan. It provides the activity status of each item, and whether the expected completion date has changed. The dates are planning dates subject to change as design and implementation details are developed.

Milestone	Target Completion Date	Activity Status	Revised Target Completion Date
<b>Submit 60 Day Status Report</b>	Oct 2012	Complete	
<b>Submit Overall Integrated Implementation Plan</b>	Feb 2013	Complete	
<b>Submit 6 Month Updates</b>			
Update 1	Aug-2013	Complete	
Update 2	Feb-2014	Not Started	
Update 3	Aug-2014	Not Started	
Update 4	Feb-2015	Not Started	
Update 5	Aug-2015	Not Started	
Update 6	Feb-2016	Not Started	
Update 7	Aug-2016	Not Started	
<b>FLEX Strategy Evaluation</b>	Jun-2013	Complete	
<b>Walk-throughs or Demonstrations</b>	May-2015 <sup>1</sup>	Not Started	
<b>Perform Staffing Analysis</b>	Jun-2014	Not Started	
<b>Modifications</b>			
Modifications Evaluation	Jun-2013	On Track	Oct-2013
Unit 1 N-1 Walkdown	Oct-2013	On Track	
Unit 1 Design Engineering	Nov-2014 <sup>1</sup>	Not Started	
Unit 1 Implementation Outage	Apr-2015	Not Started	May-2015
Unit 2 N-1 Walkdown	Apr-2014	On Track	
Unit 2 Design Engineering	Nov-2014 <sup>1</sup>	Not Started	
Unit 2 Implementation Outage	Dec-2015	Not Started	
<b>Storage</b>			
Storage Design Engineering	Sep-2013 <sup>1</sup>	Not Started	
Storage Implementation	Aug-2014 <sup>1</sup>	Not Started	
<b>On-Site FLEX Equipment</b>			
Procure	Apr-2014	On Track	
<b>Off-Site FLEX Equipment</b>			
Develop Strategies with RRC	Dec-2013	On Track	
Install Off-site Delivery Station	Apr-2014	On Track	
<b>Procedures</b>			
PWROG issues NSSS-specific guidelines	Jun-2013	Complete	
Create Site Specific FSIs	Jun-2014	On Track	
Create Maintenance Procedures	Jun-2014	Not Started	
<b>Training</b>			
Develop Training Plan	Jun-2014	On Track	
Training Complete	Dec-2015	Not Started	
<b>Unit 1 FLEX Implementation</b>	May-2015	Not Started	
<b>Unit 2 FLEX Implementation</b>	Dec-2015	Not Started	
<b>Full Site FLEX Implementation</b>	Dec-2015	Not Started	
<b>Submit Completion Report</b>	Jan-2016	Not Started	
Note: 1. These milestones were not included in the February 28, 2013, Overall Integrated Plan.			

#### 4 Changes to Compliance Method

The following is a list of changes made to the information provided in the February 28, 2013, Overall Integrated Plan (Reference 1). These changes meet the NEI 12-06 compliance method.

- 4.1 Revise Assumption 2 pg E-6, Note 14 pg E-9, Condensate Storage Tank (CST) references pg E-21 and E-23.

Install a new qualified Auxiliary Feedwater Supply Tank (AFWST) instead of using the Condensate Storage Tank (CST) for FLEX.

- 4.2 Revise reference to tank connections on pgs E-9, E-21 and E-23.

Change inlet and outlet FLEX connections from the CST to the new AFWST.

- 4.3 Revise the Refueling Water Storage Tank (RWST) alternate option for Reactor Coolant System (RCS) inventory on pg E-32.

Revised alternate RCS Inventory control flood option utilizing RWST as suction source for High Pressure pump. This source can be accessed utilizing the installed SI piping by routing a suction hose from the existing SIP A inlet drain valve to the High Pressure FLEX Pump inlet. The discharge of the High Pressure FLEX Pump will be routed using high pressure hose to the SIP A discharge piping.

- 4.4 Delete Core Exit Thermocouples (CETs) referenced on pgs E-16, 20, 27, 30, 33, 37, and Open Item OI-15.

CETs will not be required for flood.

- 4.5 Revised strategy for Attachment 1A, "Sequence of Events Timeline," pgs EA1-1 to EA1-9, for the following changes:

- a. Revised and separated Timing and Deployment in both Flood and Non-flood Scenarios.
  - Revised hose deployment based on detailed review.
- b. Revise 3 MWe DG from available within 40 hours to available within 8 hours in the event timelines.
  - Taking credit for 3 MWe DG being available at 8 hours in timelines
  - Taking credit for 3 MWe DG as a backup for the 225 kva DG

c. Revise reference to Spent Fuel Pool (SFP) strategy as described below:

- Utilize 3 MWe DGs to return normal SFP Cooling Pumps to service at 8 hours.
- Primary and secondary strategies swapped
- Increase in time for hose deployment to SFP from 6.9 hours to 15 hours.
- Time for boil off of SFP level to reach 10 feet above the SFP racks increase from 37 to 85 hours (normal decay heat load).
- Time for boil off of SFP level to reach 10 feet above the SFP racks increase from 25 to 30 hours (maximum decay heat load).

Note - TVA will provide a revised Attachment 1A to reflect these changes on or before the next 6-Month Update due February 28, 2014.

**5 Need for Relief/Relaxation and Basis for the Relief/Relaxation**

Sequoyah expects to comply with the order implementation date and no relief/relaxation is required at this time.

**6 Open Items from Overall Integrated Plan and NRC Evaluation**

The following tables provide a summary of the open items documented in the Overall Integrated Plan or the NRC Evaluation and the status of each item.

Open Item Number	Description	Status
1	The current CST is a non-seismic tank that is not missile protected. The site is currently pursuing two options; the qualification and hardening of the existing CST or the construction of a new seismically qualified and missile protected CST. One of these options must be completed before the volume of the CST can be credited.	Started
2	Liquefaction of haul routes for FLEX will be analyzed.	Started
3	No detailed analysis has been provided regarding initial FLEX fuel supplies to determine a need time for access to 7 day tank supplies or resupply of the 7 day tanks. It is assumed that each FLEX component is stored with a minimum supply of 8 hours of fuel at constant operation. This assumption will need to be assessed once all FLEX equipment has been purchased and equipment specifications are known.	Started



Open Item Number	Description	Status
4	No need time has been identified for action to protect containment. This includes actions to mitigate pressurization of containment due to steaming when RCS vent paths have been established or actions to mitigate temperature effects associated with equipment survivability. An evaluation will be provided to prove indefinite containment coping.	Open
5	A determination of where the Phase 3 equipment will be staged will be performed.	Open
6	A strategy for clearing and removing debris will be determined.	Started
7	A thorough analysis of the makeup flow rate requirements and other equipment characteristics will be performed during the detailed design phase of FLEX.	Started
8	The need time for SFP cooling actions (deployment of hose, venting, and alignment of makeup) was determined using worst case heat loads. This item will continue to be assessed and later action times may be acceptable. Note that the timing for this step during an outage is different, but resources will be available to complete the required actions.	Started
9	Functional requirements for each of the Phase 3 strategies, equipment and components will be completed at a later time and will be provided in the six month updates to the February 28, 2013 submittal.	Started
10	Containment temperature instrumentation is only available until flood waters enter the TSC inverter or station battery room. Requirements for NSSS-specific FSGs for containment temperature, as noted in Appendix F of Reference 10, are pending further evaluation. A method to monitor containment temperature, post-flood, will be developed.	Started
11	The HVAC analysis (Reference ) is preliminary analysis, and has not been finalized.	Started
12	Verify ability to deploy FLEX equipment to provide core cooling in Modes 5 and 6 with SGs unavailable.	Open
13	An evaluation of the impact of FLEX response actions on design basis flood mode preparations will be performed. This evaluation will include the potential for extended preparation time for FLEX. Changes which affect the Integrated Plan will be included in the six month update.	Started

Open Item Number	Description	Status
14	Perform an alternate cooling source evaluation. The purpose of this analysis is to examine options to utilize alternate water sources to provide continuous sources of water to maintain key safety functions.	Started
15	Perform conceptual hydraulic performance analyses. The purpose of this analysis is to conservatively evaluate hydraulic performance of FLEX systems.	Started
16	Develop a mechanical conceptual design report. The purpose of this report is to summarize the mechanical conceptual design of the FLEX strategies and identify any required modifications.	Started
17	Perform an electrical conceptual design report. The purpose of this report is to summarize the electrical conceptual design of the FLEX strategies and identify any required modifications.	Started
18	Perform an RCS makeup analysis. The purpose of this analysis is to define FLEX RCS inventory and shutdown margin for Sequoyah.	Started
19	Perform an SFP evaluation. The purpose of this analysis is to evaluate the impact of sloshing and time-to-boil in the SFP after an earthquake.	Started
20	Perform a timing and deployment evaluation. The purpose of this analysis is to summarize the FLEX timeline for Sequoyah, identify time constraints and provide for the safety function needs.	Started
21	Develop a programmatic control report. The purpose of this report is to summarize the need to implement programmatic control of the FLEX program.	Open
22	Evaluate the existing extreme hazard analysis and planned Near-Term Task Force (NTTF) Tier 1 activities on FLEX strategies to summarize on-going industry activities and the potential to impact the developed FLEX strategies.	Open
23	The time at which the Forebay volume depletes needs to be evaluated to determine the time at which replenishment is required. Based on Reference 10 there is 1,640,000 gallons available in the Forebay. Based on the Sequoyah alternate cooling source evaluation, approximately 640,000 gallons are required at 72 hours post ELAP. Therefore, it is expected the Forebay volume will supply suction to the TDAFWP for greater than 72 hours following the ELAP event and replenishment will be required during Phase 3.	Started

Open Item Number	Description	Status
24	Further analysis will be performed to determine the required timeline for implementing the 3 MWe DGs as an alternate power source for the loads supplied by the 225 kva 480 Vac DGs.	Closed  The 3 MWe DGs are available within 8 hours. A line will be added to 225kva timing to state that if 225s not available, then 3MWe to be started.
25	Complete battery calculations to document Vital Battery life of 8 hours after loss of all AC. A battery calculation has been completed for WBN which is of similar design.	Open
26	The CETs are only available until water enters the auxiliary instrument room. A method to monitor CET, post flood, will be evaluated and developed, if required.	Closed  CETs will not be required for flood.
27	Strategies to address extreme cold conditions on the RWST and/or BATs, including potential need to reenergize heaters, have not been finalized	Closed  Irrelevant as the BATs will be exhausted by the time the extreme cold has an effect on the tanks.
28	Establish a contract with the SAFER team in accordance with the requirements of Section 12 of Reference 2.	Started

## 7 Potential NRC Evaluation Impacts

There are no potential impacts or OIs to the NRC Evaluation identified at this time.

## 8 References

The following references support the updates to the Overall Integrated Plan described in this attachment.

1. Letter from TVA to NRC, "Tennessee Valley Authority (TVA) - Overall Integrated Plan in Response to the March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049) for Sequoyah Nuclear Plant," dated February 28, 2013.
2. NRC Order Number EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated March 12, 2012.